

REMARKS¹

In the final Office Action, the Examiner objected to claim 18 for various informalities; rejected claims 14-29 and 31² under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,270,257 to Shin ("Shin") in view of U.S. Patent No. 5,949,116 to Wen ("Wen"); and rejected claim 32 under 35 U.S.C. § 103(a) as being unpatentable over Shin in view of Wen, and further in view of U.S. Patent No. 6,228,763³ to Lee ("Lee"). No claims are amended herein. Claims 1-29, 31, and 32 remain pending in this application.

I. Claim Objections

Regarding the objection to claim 18, the Examiner apparently asserts that "selectively forming a first film on said semiconductor substrate," as recited in claim 18, needs to be amended for clarity. Specifically, the Examiner states that:

[i]t is confusing and not clear if Applicants' are referring to selectively forming by means of different processes ... different conditions or selectively forming first film on the whole semiconductor substrate but not on other parts of the device or selectively forming i.e. forming the first film on a portion of the substrate. Office Action, page 3 (emphasis added by the Examiner).

1 The Office Action contains a number of statements reflecting characterizations of the related art and the claims. Regardless of whether any such statement is identified herein, Applicants decline to automatically subscribe to any statement of characterization in the Office Action.

2 Although on page 4 of the Office Action the Examiner indicates that claim 32 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Shin in view of Wen, Applicants believe that this is a typographical error because the Examiner indicates on page 7 of the Office Action that claim 32 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Shin in view of Wen and further in view of Lee.

3 Although in the outstanding Office Action the Examiner cited U.S. Patent No. 6,248,622, attributed to Lee, Applicants believe that the Examiner meant to cite U.S. Patent No. 6,228,763 also attributed to Lee, as in previous Office Actions.

The Examiner further states that “the first film should be identified as ‘first oxide film.’”

Id. Applicants respectfully traverse the Examiner’s objection, because the Examiner’s position is not in accordance with standard U.S. patent practice.

Applicants initially submit that Fig. 3A of the present application illustrates “selectively forming a first film (9) on said semiconductor substrate (1),” as recited in claim 18, and clearly shows the “selective form[ation].” This is further described in Applicants’ specification at, for example, page 12, lines 8-10. Accordingly Applicants respectfully submit that the element “selectively forming a first film on said semiconductor substrate,” as recited in claim 18, is clear and definite, in light of the specification and the drawings.

Applicants note that the Examiner’s objection to claim 18 appears to stem from the Examiner’s assertion that Applicants must narrow their claims in order to recite what is detailed in the specification. The Examiner’s position, however, is not in accordance with standard U.S. patent practice. For example, MPEP § 2163.02 states:

[t]he subject matter of the claim need not be described literally (i.e. using the same terms or *in haec verba*) in order to satisfy the description requirement.

Similarly, MPEP Section 2164.08 states:

[l]imitations and examples in the specification do not generally limit what is covered by the claims.

Accordingly, Applicants submit that the Examiner’s position is not in accordance with the MPEP, and thus Applicants respectfully request that the Examiner withdraw the objection of claim 18.

II. Rejections under 35 U.S.C. § 103(a)

Applicants respectfully traverse the rejection of claims 14-29, 31, and 32 under 35 U.S.C. § 103(a) because a *prima facie* case of obviousness has not been established. To establish a *prima facie* case of obviousness under 35 U.S.C. §103(a), each of three requirements must be met. First, the reference or references, taken alone or combined, must teach or suggest each and every element recited in the claims. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the references in a manner resulting in the claimed invention. Third, a reasonable expectation of success must exist. Moreover, each of the three requirements must “be found in the prior art, and not be based on applicant’s disclosure.” See MPEP § 2143, 8th Ed. (Rev. 4), October, 2005.

In this application, no *prima facie* case of obviousness has been established for at least the reason that the cited references, whether taken alone or in combination, fail to teach or suggest every element recited in claims 14-29, 31, and 32.

A. Claims 14-21

Regarding the Examiner’s rejection of independent claims 14 and 18 under 35 U.S.C. § 103(a) as being unpatentable over Shin in view of Wen, each of claims 14 and 18 recites a combination including “removing said second film to form a second groove on the semiconductor substrate ... [and] forming a gate insulator film in said second

groove.” Shin and Wen, whether taken alone or in combination, fail to teach or suggest at least this element.

The Examiner concedes: “Shin does not specifically disclose the steps of ... removing said second film to form a second groove in the semiconductor substrate.” Office Action, pages 4-5. The Examiner alleges that Wen cures the deficiencies of Shin, stating that Wen teaches “removing the second film to form a second groove,” citing Figure 2C, wherein elements 201 and 207 of Wen, apparently characterized by the Examiner as constituting Applicants’ claimed “second film,” are removed to form a second groove element 209 of Figure 2C. Id. The Examiner further alleges that Wen teaches or suggests the limitation “forming a gate insulator film in said second groove” at elements 210 in Figs. 2D to 2F.

Contrary to the Examiner’s allegation, element 210 is an insulating layer and not part of the gate structure. See Wen, col. 3, lines 23-24. Moreover, since element 210 of Wen is formed outside of the region beneath gate 204, and not between the source and drain regions, element 210 cannot act as a gate structure. Thus, element 210 of Wen cannot constitute “a gate insulator film” formed in a second groove, as characterized by the Examiner. Accordingly, Wen also fails to teach or suggest “removing said second film to form a second groove on the semiconductor substrate ... [and] forming a gate insulator film in said second groove” as recited in claims 14 and 18.

Because Shin and Wen fail to teach or suggest every element recited in claims 14 and 18, a *prima facie* case of obviousness has not been established. Accordingly,

Applicants respectfully request that the Examiner withdraw the rejection of claims 14 and 18 under 35 U.S.C. § 103(a).

Claims 15-17 and claims 19-21 respectively depend from claims 14 and 18, and thus require all of the elements recited in claims 14 and 18. As discussed above, Shin and Wen fail to teach or suggest every element recited in claims 14 and 18, and required by claims 15-17 and 19-21, and thus a *prima facie* case of obviousness has not been established with respect to claims 15-17 and 19-21. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of claims 15-17 and 19-21 under 35 U.S.C. § 103(a).

B. Claims 22-26

Regarding the Examiner's rejection of independent claim 22 under 35 U.S.C. § 103(a) as being unpatentable over Shin in view of Wen, claim 22 recites a combination including "controlling a thickness of the gate insulator film so that a top surface of said gate insulator film is higher than a top surface of said impurity diffusion region." As noted above with respect to claims 14 and 18, the references, either taken alone or in combination, fail to teach or suggest at least this element. Specifically, even if gate oxide film 23 of Shin (Figure 3b) is considered to be a gate insulator film formed in a groove, the thickness of the alleged gate insulator film 23 is not such that the top surface of the gate insulator film is higher than a top surface of the impurity diffusion region (elements 26a,b in Figure 3c of Shin).

Wen does not cure this deficiency. The Examiner alleges that element 210 of Wen as shown in Figs. 2D to 2F constitutes a gate insulating layer. Office Action, page 6. For reasons similar to those given above in the discussion of claims 14 and 18, element 210 of Wen **cannot** constitute a gate structure.

In any event, *even if* insulator 210 of Wen could be reasonably construed to constitute Applicants' claimed "gate insulator film," element 210 is formed such that the top surface of 210, as shown in Fig. 2D of Wen, is below a top surface of the impurity diffusion region 217 (see Fig. 3). Accordingly, Wen fails to teach or suggest "controlling a thickness of the gate insulator film so that a top surface of said gate insulator film is higher than a top surface of said impurity diffusion region," (emphasis added) as recited in independent claim 22.

Because Shin and Wen fail to teach or suggest every element recited in claim 22, a *prima facie* case of obviousness has not been established. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of claim 22 under 35 U.S.C. § 103(a).

Claims 23-26 depend from claim 22, and thus requires all of the elements recited in claim 22. As discussed above, Shin and Wen fail to teach or suggest every element recited in claim 22, and required by claims 23-26, and thus a *prima facie* case of obviousness has not been established with respect to claims 23-26. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of claims 23-26 under 35 U.S.C. § 103(a).

C. Claims 27-29 and 31

Regarding the rejection of independent claim 27 under 35 U.S.C. § 103(a) as being unpatentable over Shin in view of Wen, claim 27 recites a combination including “sequentially depositing on the semiconductor substrate a high dielectric film to serve as a gate insulator film and a polycrystalline semiconductor film to serve as a gate electrode, to form a laminate structure.” The references, whether taken alone or in combination, fail to teach or suggest at least this element.

Shin teaches “a nitride layer 22 is first deposited on a silicon substrate ... [and] is then subjected to a photo lithography process, to etch the portion thereof positioned as the region where a gate is to be formed.” Shin, col. 4, lines 20-23 (emphasis added). Shin then teaches “a gate oxide layer 23 is grown on the overall exposed trench surface ... [and] a polysilicon layer 24 is thickly deposited to fill the trench of silicon substrate.” Id., at col. 4, lines 30-37. Shin thus teaches depositing nitride layer 22, etching nitride layer 22, forming gate oxide layer 23, then forming polysilicon layer 24. Accordingly, Shin fails to teach or suggest “sequentially depositing on the semiconductor substrate a high dielectric film to serve as a gate insulator film and a polycrystalline semiconductor film to serve as a gate electrode, to form a laminate structure,” as recited in claim 27.

Wen fails to cure the above noted deficiency of Shin. Wen teaches “an insulating layer is formed, for example, by thermal oxidation, to provide a field oxide with a bird’s beak structure ... followed by the formation of a gate oxide layer 203 and a gate 204, in

order, on the substrate.” Wen is silent to at least “a high dielectric film,” and “a laminate structure,” and thus cannot provide a teaching or suggestion of “sequentially depositing on the semiconductor substrate a high dielectric film to serve as a gate insulator film and a polycrystalline semiconductor film to serve as a gate electrode, to form a laminate structure,” as recited in claim 27.

Because the Shin and Wen fail to teach or suggest every element recited in claim 27, a *prima facie* case of obviousness has not been established. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of claim 27 under 35 U.S.C. § 103(a).

Claims 28, 29, and 31 depend from claim 27, and thus require all of the elements recited in claim 27. As discussed above, Shin and Wen fail to teach or suggest every element recited in claim 27, and required by claims 28, 29, and 31, and thus a *prima facie* case of obviousness has not been established with respect to claims 28, 29, and 31. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of claims 28, 29, and 31 under 35 U.S.C. § 103(a).

Even if the Examiner believes that Shin and Wen, in combination, teach every element of claims 14, 18, 22 and 27, which they do not, there is a lack of motivation to incorporate the teachings of Wen into the method of manufacturing the MOS device of Shin. The methods of manufacturing used to produce the devices of Shin and Wen are very different, and the Examiner is suggesting that one of ordinary skill in the art would have been motivated to take the structure produced by the method of Wen in Figures

2A-2C and substitute them into the method of Shin as shown in Figure 3a. The Examiner has improperly performed a hindsight reconstruction of the references to obtain Applicants' claimed invention.

D. Claim 32

Regarding the Examiner's rejection of independent claim 32 under 35 U.S.C. § 103(a) as being unpatentable over Shin in view of Wen and further in view of Lee, claim 32 recites a combination including "selectively depositing semiconductor layers serving as said source/drain regions so that an inclined surface is formed between the top surface of said semiconductor layers and said channel region." The references, whether taken alone or in combination, fail to teach or suggest at least this element of claim 32.

Shin teaches the formation of source/drain regions 26 a,b and 28 a,b (Fig. 3e) on top of semiconductor substrate 21 (as shown in Fig. 3a). While it appears a surface of source 26a and drain 26b is inclined, the "top surface" of the semiconductors layers is a top surface of source 28a and drain 28b, which are on top of source 26a and drain 26b, respectively. On this basis, Applicants submit that Shin fails to teach or suggest "selectively depositing semiconductor layers ... so that an inclined surface is formed between the top surface of said semiconductor layers and said channel region," as recited in independent claim 32.

Wen fails to cure the above-noted deficiencies of Shin. Wen shows diffusion regions 200 and 217, but fails to show "an inclined surface" between these regions and

a region beneath gate oxide 203 that may correspond to a channel region. Lee, cited only for the T-shaped cross-section, does not cure the above-noted deficiencies of Shin and Wen, and is not relied upon by the Examiner for such teachings. That is, both Wen and Shin fail to teach or suggest a combination including "selectively depositing semiconductor layers ... so that an inclined surface is formed between the top surface of said semiconductor layers and said channel region," as recited in independent claim 32.

Because the references fail to teach or suggest every element recited in claim 32, a *prima facie* case of obviousness has not been established. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of claim 32 under 35 U.S.C. § 103(a).

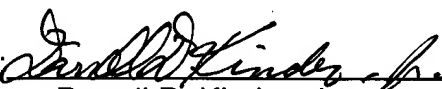
In view of the foregoing remarks, Applicants respectfully request reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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